Engaging Food Service Workers in Behavioral–Change Partnerships

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Abstract

When food inspectors pay educational visits to food service establishments, the goal is prevention. For that reason, such visits form a valuable component in local-government programs to improve food safety. The efficacy of educational programs can be measurably improved by the application of behavioral-change theory.

The study reported here was conducted with the cooperation of Key Arena Sportservice, a large sports arena in downtown Seattle, Washington. The facility serves 1.2 million customers per year through 40 individual food service operations staffed by approximately 250 workers. Analysis of facility inspection reports for the period 1998 through 2001 identified three key types of violation. Problematic food preparation processes were analyzed and modified through the application of behavioral-change theory. Food safety inspection reports were used to detect and evaluate changes in behavior. Results from the study appear to support the authors' hypothesis, which was that sustainable improvements in food safety, as measured by food service inspection scores, can be achieved through the systematic application of behavioral-change theory in active partnership with industry.

Introduction

Local government health promotion programs are essential to reducing disease risks and improving the health and well-being of individuals. Food protection programs typically use legislative and regulatory approaches, which are often cited as the most potent means of facilitating healthful behavior (Breslow, 1973; Institute of Medicine, 1979). Regulatory approaches alone, however, do not necessarily ensure adoption of the regulated behavior. As a result, restaurants may repeatedly commit food safety violations upon inspection and may incur closures.

Many program planners believe that by enhancing knowledge or altering attitudes, they can induce behavioral change. Numerous studies document that education alone may not result in behavioral change, and that to change most complex behaviors, multifaceted approaches are needed (McKenzie-Mohr & Smith, 1999). To influence what food workers do and how they do it, it is necessary to understand what they perceive to be the barriers to and benefits of an action; those perceptions underlie the behavioral choices they make. Food protection programs may be more effective when barriers are removed and benefits are enhanced so that the target behavior becomes more attractive.

Food protection programs may be more likely to succeed if they are based on a clear understanding of target behaviors identified by a needs assessment and on the use of behavioral-change models that address improper food-handling methods. Behavioral-change theories provide guidance in addressing questions about why individuals act, what they do, and how they do it, as well as how they think with respect to issues of proper food handling. In this way, they guide the investigation into why people are not taking preferred actions (Glanz, Lewis, & Rimer, 1997). They provide insight into the shaping of program strategies and the choice of items to be measured in a program evaluation. Identifying barriers to desirable behavior (i.e., the mutable causes of failure to apply those behaviors) lays the groundwork for planners to determine what theories will be most appropriate to change behavior. To achieve needed constituency involvement, a public health leader must understand what motivates and moves constituents to action on public health issues (Nicola, Ray, & Hatcher, 2000).

"Mutable causes" are the behavioral barriers that influence people's actions and thought processes. With respect to a desired behavior, environmental health programs should address mutable causes, not the incident or the prevalent problem. If environmental health specialists understand a mutable cause, such as the reason a food worker is using improper cooling methods, the problem can be addressed within a context that is understood. In this way, the behavior may be changed, and repeat violations could be eliminated.

The study reported here took as its hypothesis the proposal that sustainable improvements in food safety, as measured by food service inspection scores, can be achieved through the systematic application of behav-

ioral-change theory in active partnership with industry. To test that hypothesis, the authors worked with Key Arena Sportservice, a sports arena in Seattle, Washington, that serves 1.2 million customers per year through 40 individual food service operations staffed by approximately 250 workers.

Methods

Key Arena's food inspection reports from 1996 through 2000 were reviewed. The review covered 389 inspection reports for 36 facilities. The three areas of violation that consistently represented the majority of citations were handsink/handwashing, improper storage of ice scoops, and lack of sanitizer (Table 1). These violations were selected for the comparison because environmental health specialists identified them as chronic problems. Hot-holding was seen as an anomalous problem, with more than 60 percent of the violations occurring in a single year, 1996.

A written survey was conducted of management and food staff (156 respondents were surveyed) to help identify the "mutable causes" involved in the frequency with which violations of these three types occurred. The survey results were used to develop strategies for motivating food workers to change their behavior. Environmental health specialists worked with management to develop a training plan and management intervention.

Theories and Influencing Action

The authors' needs assessment helped identify four applicable behavioral-change theories: Health Belief Theory, Consumer Information Processing Theory, Social Learning Theory, and Social Cognitive Theory. Table 2 lists these theories and related materials, including the application of the theories, sample responses from the survey needs assessment, and actions that may influence behavioral change.

If any form of sustainable behavior change is to be adopted by food service workers, the mutable causes involved in the activity must be identified. For example, a mutable cause internal to food staff involved a lack of knowledge with respect to the question "How do you know if a food is in the proper temperature zone?" (77.8 percent responded correctly, 22.2 percent incorrectly). External mutable causes also were noted; certain management decisions could make behavior change more convenient, such as providing ice scoop holders or sanitizing systems. Solution strategies were devised after stakeholders identified mutable causes that commonly discourage people from the desired behaviors. Table 3 demonstrates how program interventions were changed to effect the desired behavior change.

Captivate the Audience and Use Alternative Teaching Methods

How do environmental health professionals capture the attention of food service workers they wish to persuade? This study conducted a survey that identified worker interests in order to recruit worker participants. Half of the survey respondents (156 were surveyed) said that they would prefer to learn by practical hands-on experience, followed by 22 percent who preferred visually interesting presentations and 20 percent who preferred demonstrations. The survey indicated that the *least* effective way to get the workers' attention was through the two main teaching tools used by many public health officials—printed material (preferred by 4 percent) and videos (preferred by 5 percent). Interest in practical, hands-on exercises was strong. One of the solutions, therefore, involved setting up a "mock" restaurant as a training program. Food staffs were asked to play the role of an environmental health specialist and were equipped with clipboard, inspection form, thermometer, and sanitizer test paper. Upon completion of the inspection, individual reports were self-graded and environmental health specialists were on hand to answer any questions. Participants' comments were universally positive. Comments included the following: "The exercise was a good solution to help improve awareness of safe food preparation," "Finally I learned how to 'temp' food," and "I didn't understand how to check for sanitizer." In the comment section of the evaluation, many staff suggested the exercise become a permanent training exercise.

Restaurant workers were asked, "If you were the inspector, how would you get people to change improper food preparation methods?" Responses included education (55 percent), negative reinforcement (40 percent), and positive reinforcement (5 percent). Suggestions for education mainly emphasized hands-on learning experience. Negative-reinforcement suggestions included fining the restaurant, taking away its permit, or firing the employee. Positive-reinforcement suggestions included incentives programs or rewarding people for doing things correctly.

TABLE 1

Total Numbers of Violations Cited, by Type, 1996–2000

Raw meats stored over ready-to-eat foods	2
Improper cooling	1
Room temperature storage of potentially hazardous foods (70–120°F)	0
Room temperature storage (46–69°F or 121–139°F)	5
Cold-holding	1
Hot-holding	24
Handsink/handwashing	36
Sneeze guards or double stacking	2
Ice scoop storage	31
Sanitizer	36

Results and Analysis

The raw data collected for the periods before and after intervention are shown in Table 4. Since the numbers of inspections were dissimilar between the two periods, this simple tally is insufficient to suggest trends and effects. When expressed as percentages of inspections showing a given violation, however, the comparison indicates a marked drop in violation rates for each of the four targeted violation categories. In addition, when all of the nontargeted violations are subjected to the same calculation, a slight increase is noted (Table 5). This result is of interest, since the frequency of inspections increased in the post-intervention period, and other studies have postulated that violation rates will decrease with increased inspection frequency (Allwood, Borden-Glass, & Petrona, 1999). While that effect is demonstrated in the item labeled All Categories in Tables 4–7, it is remarkable to note that no significant change occurred in the nontargeted categories of violations.

Since these data were collected on a retrospective basis and were the product of many different inspectors, bias was not introduced into the inspection process itself. For a more powerful analysis of the data, odds ratios were calculated to validate the apparent positive effect of intervention strategies (Table 6). Odds ratios are intended to highlight potential cause-effect relationships. They do so by multiplying two fractions. The first fraction measures the effect of a variable, and the second measures the effect in the absence of the variable. In this case, the variable is intervention and the effect

TABLE 2

Behavioral-Theory Application

Theory, Concepts	Application of Theory: What Makes People Do What They Do?	Sample Responses	Influencing Action
Health Belief Theory: perceived severity, perceived barriers	One's opinion of the advised action or perception of the seriousness of the impact	"I didn't realize the possible dangers."	a. Specify consequences of the risk. b. Increase awareness of need for change. c. Personalize information on risks and benefits. d. Provide how-to information, promote awareness, and employ reminder systems. e. Identify and reduce barriers through reassurance, incentives, and assistance. f. Provide training and guidance in performing action. g. Use progressive goal setting. h. Use verbal reinforcement. i. Demonstrate desired behaviors. j. Reduce anxiety.
Self-efficacy	One's opinion of the tangible action	"I don't have buckets for sanitizer solutions."	
Social cognition	Confidence in one's ability to take action	"The manager or supervisor checks temperatures—not me."	
Consumer Information Processing Theory	Individual limitations on the amount of information workers can acquire, use, & remember	"I need reminders from the boss."	a. Choose the most important and useful points to communicate, whether orally or in print materials.
Information processing capacity	Rules of thumb developed to help follow procedures	"I need signs."	b. Learn to synthesize information in ways that have meaning and appeal to your audience.
Decision-making rules, information search	Processing of acquired information, affected by motivation, attention, perception	"I'd like helpful reminders in certain places."	c. Reminder minimizes effort required to obtain information, draws attention, & is clear.
Social Learning Theory	Knowledge & skills to influence behavior	"Tell me how to do something, show me, then tell me again."	a. Provide information & training about action.
Behavioral capability	Beliefs about likely results of action	"The worker has an irresponsible attitude, poor work ethic."	b. Incorporate information about likely results of action.
Expectations, reinforcement	Responses to a person's behavior that increase or decrease the chances of recurrence	"Managers remind us when job is done wrong."	c. Provide incentives, rewards, praise; encourage self-reward; decrease possibility of negative responses that deter positive changes.
Social Cognitive Theory	Knowledge & skill to perform a given behavior	The food is okay to serve "when it turns brown."	a. Promote mastery learning through skills training.

is no violations. Positive odds ratios indicate positive correlation (Figure 1). While the initial calculation of odds ratios for the same data categories does not eliminate the effects of increased inspection frequencies in the post-intervention period, the trends suggested in Table 4 and Table 5 remain after calculations for odds ratios are applied (Table 6, Table 7).

Discussion

The analysis of the data strongly supports the value of interventions based on behavioral-change theory. The use of percentages of inspections with violations as a basis for analysis (Table 5 and Table 7) averts any effect that an increased number of inspections may have had in the post-intervention period. A slight increase in violation rates in the nontargeted categories of violations seen in these data sets continues to support a correlation between intervention and behavioral change, and the analysis in Table 5 completes the validation of the authors' findings.

The results of this study indicate that behavioral-change partnership may improve inspection report scores. Since the introduction of government systems of food quality control, officials have recognized that along with appropriate regulations governing the retail food trade, regular inspection of food establishments is needed for education and enforcement purposes (Hanlon, 1960). Today,

FIGURE 1

Odds Ratio Calculation

$(na/vb) \times (nb/va)$

Where

- na = inspections with no violations, post-intervention period,
- nb = inspections with no violations pre-intervention period,
- va = inspections with violations after intervention, and
- vb = inspections with violations before intervention.

with advances in understanding of the factors that influence behavior change, education of food workers may play a far more significant role in promoting safe behavior than does enforcement (Allwood et al., 1999).

Behavioral-change professionals state that "the design of interventions that yield desirable changes can best be done with an understanding of theories of behavioral change and an ability to use them skillfully in practice" (Glanz et al., 1997). While instincts about how to involve the public can be useful, social science research is better (Chess, 2000).

The analysis by Sportservice management of operational barriers included an assessment of the potential risks of making policy or equipment modifications and the benefits of the outcome. Since use of safe technologies and operating procedures can minimize health risks to the public, management weighed the costs of changing equipment, such as sanitizer systems, against the potential public health risk the change might affect. Sportservice serves as many as 15,000 customers in a two-hour period. This rate requires a fast-paced, team-oriented spirit. Reducing barriers, increasing benefits perceived by staff, and eliminating potential causes of a disease outbreak would be less costly to the corporation than a disease outbreak.

The authors' process evaluation addressed how the strategies were affecting behavioral change. Midway through the project, it was found that some fine-tuning was needed to obtain the desired behavioral changes. For example, many food service workers have day and night jobs. With their busy schedules, the staff found it difficult to remember the proper food-holding temperatures. They requested additional signage to remind them of what the proper temperatures were for hot-holding foods. Sportservice changed products and recipes that affected food temperatures. Time-temperature charting made hot-holding more effective. These changes appear to have improved food-handling practices despite high rates of staff turnover in the Sportservice food businesses.

Conclusions

Greater success is achievable with the application of proven behavioral-change theories to the design and implementation of public education programs. These programs, if designed appropriately, will help environmental health specialists identify behaviors that reduce disease risks, improve understanding of disease prevention methods, and promote general health and well-being.

TABLE 3

Development of Solution Strategies

The Change or Desired Effect	How
Increase awareness of need for change.	Demonstrate proper handwashing, testing of sanitizer strength, and proper scoop storage.
Improve the personalization of information on risks and benefits.	Personalize information (e.g., hot dog recall, Listeriosis, and the potential consequence of serving undercooked hotdogs at the family picnic).
Improve understanding and specify consequences of the risk.	Use local examples of restaurant foodborne-disease outbreaks; cite risk in serving large populations, risk of potentially creating life-and-death health problems, and bad publicity.
Expand on how-to information, promote awareness, and employ reminder systems.	Use signage for sanitizer and handwashing (change signage at least quarterly, to keep reminders "fresh"), maintain time-temperature logs, and make self-assessments of food stands to evaluate progress.
Expand the identification and reduction of barriers through verbal reassurance, incentives, praise, & rewards; encourage self-rewards & give assistance.	Ideas include a poster contest, best-inspection-report award, pay incentive, plaque, romantic dinner in the sports lounge.
Increase training and guidance in performing action.	Involve staff in performing mock inspections.
Use progressive goal setting.	For repeat offenders, set goals to help staff be more accountable (e.g., develop a checklist for opening a restaurant station).
Improve desired behaviors through demonstration.	One of the most effective methods for increasing the adoption of sustainable behavior is to model the behavior we wish others to adopt.
Improve ways to synthesize information in ways that have meaning and appeal to your audience.	Use a newsletter or a weekly message system to re-emphasize key food protection points. Provide information that takes little effort to absorb, draws attention, and is clear.

TABLE 4

Numbers of Violations, by Category, Before and After Intervention

	Before Intervention	After Intervention
Number of inspections	166	281
Nontargeted categories	7	12
All targeted categories	75	56
Hot-holding	16	11
Handsinks	24	8
Ice scoops	17	18
Sanitizer	18	19
All categories	82	68

In this study, public health inspections report scores showed marked improvements. Implementation of new strategies is a continuous effort by health departments and the food service industry.

Enforcement actions taken in response to an immediate public health risk often are only a temporary solution. Since inspections cover less than 0.05 percent of the time that an establishment may be operating, effective behav-

TABLE 5

Percentages of Inspections with Violations, Before and After Intervention

	Before	After	Net Change
Nontargeted categories	4.3%	4.4%	+0.1%
All targeted categories	45.2%	19.9%	–23.1%
Hot-holding	9.5%	4.0%	–5.5%
Handsinks	14.8%	2.7%	–12.1%
Ice scoops	10.0%	6.4%	–3.6%
Sanitizer	11.0%	6.7%	–4.3%
All categories	49.5%	24.2%	–25.3%

TABLE 6

Odds Ratios for Decrease in *Actual* Number of Violations, by Category

Nontargeted categories	1.0
All targeted categories	3.3
Hot-holding	2.6
Handsinks	5.8
Ice scoops	1.7
Sanitizer	1.7
All categories	3.1

TABLE 7

Odds Ratios for Decrease in Violation *Rates* After Intervention

Nontargeted categories	1.0
All targeted categories	3.3
Hot-holding	2.5
Handsinks	6.3
Ice scoops	1.6
Sanitizer	1.7
All categories	3.1

ioral change must be maintained without constant and direct observation by an environmental health program. The framework for this study started with food service staff investing their energy to identify mutable causes, solutions, and preferred training methods.

Regulatory agencies cannot easily bring about internal or systemic changes on the strength of regulations alone. A partnership with management and food service workers helps environmental health programs find solutions that affect behavioral change. These changes may include new or revised policies, re-allocation of resources, and establishment of a new local government identity among business partners. Partnership empowers the private sector to suggest ways for local government and industry to obtain mutual benefits, such as a reduction in food service violations, while at the same time providing safe, wholesome food.

This study is a work in progress. It suggests that public health leaders advocate for new methods of providing food protection services. In other words, it requires public health leaders to "think outside the box" and to dedicate the time and resources necessary for development of effective partnerships. Environmental health staff may need training in these new skills and may need to be provided with methods of adapting effective interventions and activities to diverse cultures. Behavioral-change strategies, specific targeted education, and the fostering of local government and business partnerships are key to successful and sustainable behavioral change (Jenkins-McLean, 1991).

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